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A NEW GENUS AND SPECIES OF COMMENSAL SCALEWORM (POLYCHAETA:POLYNOIDAE)

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ABSTRACT

A new genus and species *Disconatis contubernalis* gen. et sp. nov. from Northern Territory, Australia is described. The new species is commensal, living in the tubes of maldanid polychaete worms. *Lepidasthenia accolus* Estcourt is redescribed, and transferred to *Disconatis.*

KEYWORDS: Polychaeta, Polynoidae, new genus and species, commensals, Northern Territory, Australia.

INTRODUCTION

The dominant intertidal habitat on the coastline of the Australian Northern Territory is expansive mudflat, often backed by mangroves. Sampling for polychaete worms on these mudflats has shown maldanid worms are one of the more common components of the polychaete fauna. Maldanid worms inhabit tubes and, although not as common as some tube dwelling worms reported from mudflats in temperate latitudes, there are places on the Northern Territory coastline where many hundreds of tubes occupied by maldanid worms can be seen protuding from the mud.

While examining some maldanid worms and their tubes collected from Ludmilla Creek near Darwin, Northern Territory in 1983, the presence of a small scaleworm (Polychaeta:Polynoidae) in one of the tubes was noted. Closer inspection of the specimen revealed a number of unusual features and suggested it probably represented a species new to science.

Subsequently several collections of maldanid worms and their tubes have been obtained from a variety of locations in the hope of accumulating enough material of this interesting scaleworm to permit the description of a new species.

To date, only four more specimens have been found, suggesting that the species is rare. Examination of the specimens indicates the suite of characters which differentiate the animals as members of a new genus and species are common to all, thereby allowing us to proceed with a description.

Since the discovery of the first specimen, the existence of a commensal scaleworm inhabiting the tube of an arenicolid polychaete worm from New Zealand has come to our attention. The type of *Lepidasthenia accolus* Estcourt, 1967 bears a close similarity to the scaleworms we have collected from maldanid worm tubes and we consider both species to be members of the same genus.

The following abbreviations are used in the text: NTM, Northern Territory Museum, Darwin; NZOI, New Zealand Oceanographic Institute, Wellington.

SYSTEMATICS

Family Polynoidae
Disconatis gen. nov.

Type species *Disconatis contubernalis* sp. nov.

Diagnosis. Body elongate, almost quadrate in cross-section, uniform width, tapering rapidly anterior and posterior ends. Up to 152 segments. Elytra and small elytrophores numerous pairs, on segments 2, 4, 5, 7, 9, 11, continuing on alternate segments to end of body. Elytra small, vestigial and translucent, first pair much larger than subsequent pairs (Figs 2D, 3D, 5G). Prostomium bilobed, hexagonal, broader than long. Cephalic peaks absent. Two pairs of eyes. Two palps. Three antennae, lateral antennae inserted ventrally, median ceratophore curved upwards. Lateral antennae with ceratophores fused to underside of prostomium but not fused to each other in the midline (Fig. 1F). First or tentacular segment not distinct dor-

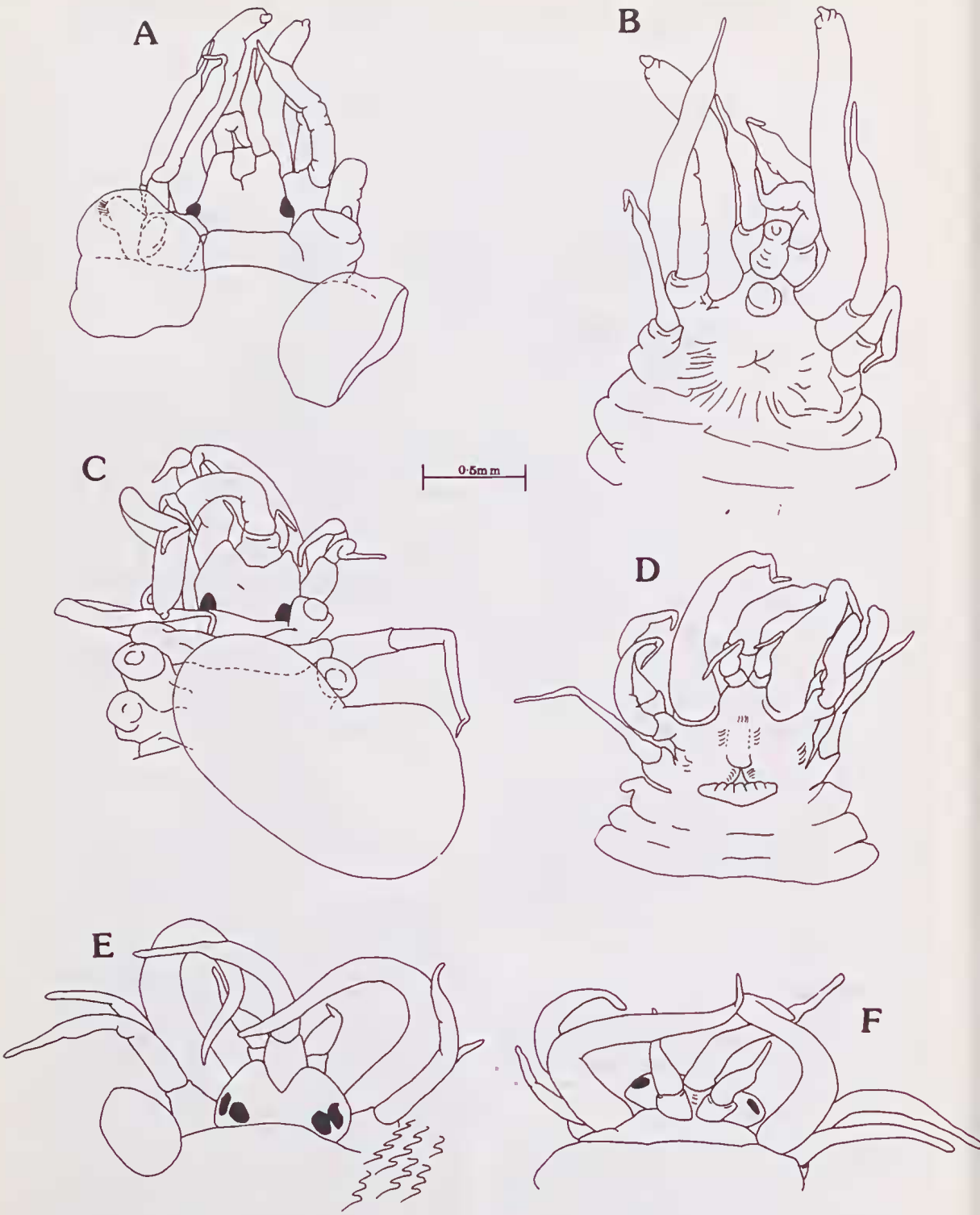

Fig. 1. Comparison of attachment of lateral ceratophores on prostomium: **A, B,** dorsal and ventral views of anterior end of *Lepidasthenia* sp. NTM W4200; **C, D,** same of *Harmothoe praeclara* NTM W1566; **E, F,** same of *Lepidasthenia accolus* holotype (note parapodia of right side missing).

sally; tentaculophores lateral to prostomium, achaetous, with two pairs of tentacular cirri. Segment 2 with elongate buccal cirri. Parapodia subbiramous; notopodia small, vestigial with notoaciculae without notosetae (Figs 2C, 3C, 4B, C, D, E, 5H). Neuropodia relatively long, thin with rounded presetal and postsetal lobes, deeply incised dorsally and ventrally. Neurosetae with row of serrations on outer convex edge of tips. Dorsal cirri present on non elytrageous segments with cylindrical cirrophores and distal styles, ventral cirri short. Pygidium moderately large, flattened disc with dorsal anus and pair of minute anal cirri (Figs 2E, 5A).

Etymology. The generic name alludes to the distinctive shape of the pygidium.

Remarks. The prostomial features of the new genus *Disconatis* do not allow it to be placed in the subfamily Lepidonotinae Willey, 1902. Reference to the criteria established for determining subfamily classification (Hanley 1987) demonstrates both species of *Disconatis* are not lepidonotoid. In members of the Lepidonotinae, the lateral antennae are attached directly to the prostomium often with no discernable suture between ceratophore and prostomium. Species of the genus *Lepidasthenia* Malmgren, 1867 are typically lepidonotoid (Fig. 1A, 1B) and

Table 1. Comparison of major characters between genera of Harmothoinae (Polynoidae). (Compiled from Pettibone 1969, Hartmann-Schroder 1960, Bidenkap 1907).

Genus	*Pairs of Elytra*	*Elytra attached to segment No.*	*Notosetae*	*Neurosetae*	*Other*
Disconatis gen. nov.	22-80	2,4,5,7,9,11 and alternate segments to end of body	absent	unidentate, serrations on convex edge of tips.	elytra vestigial, commensal with other Polychaetes Australasian
Grubeopolynoe Pettibone, 1969	Numerous Pairs up to 50 or more	2,4,5,7, alternate segments to 23,26,29,32 35,36,39,40, continuing to end of body with two pairs of elytra alternating with two pairs of dorsal cirri	2 types, short, stout, blunt tips, and longer, tapering to slender tips	mainly unidentate, sometimes with slight 2° tooth, setae of 2nd segment slender, different from the rest.	elytra large, commensal with other polychaetes North Pacific
Hololepidella Pettibone, 1969	up to 26 or more	2,4,5,7, alternate segments to 23,26,29,31, 34, alternate segments to end of body; sometimes irregular on posterior segments	stouter than neurosetae, nearly smooth, a few widely separated spines	with spinous regions, tips entire or bidentate.	elytra large, commensal with echinoderms Indo-West Pacific
Neohololepidella Pettibone, 1969	up to 50 or more	2,4,5,7, alternate segments to 23,26,29,32 34, alternate segments to end of body	numerous, thicker than neurosetae, nearly smooth tapering to blunt tips	numerous, with numerous spinous rows, slightly bifid and entire.	elytra size? associated with calcareous sponge Central Indian Ocean
Parahololepidella Pettibone, 1969	numerous	2,4,5,7, alternate segments to 23,26,29,32, 33,35, alternate segments to end of body; some irregularity posteriorly	thinner than neurosetae, short, stout, tapering to blunt tips.	stout, with faint spinous regions and slightly hooked, entire tips.	elytra small, found in tubes composed of sand grains tropical Atlantic
Polyeunoa Pettibone, 1969	at least 15	2,4,5,7, alternate segments to 23,26,29, 29, with or without some additional elytra, sporadically arranged, 1-14 extra pairs may be present, sometimes asymmetrical	me thickness or thicker neurosetae, short to long, smooth or lightly serrated, tapering to blunt tips.	stout, with enlarged spinous regions and bare, nearly straight tips which are sometimes notched.	anterior elytra large, posterior elytra small when present, from alcyonarians and gorgonians and deep water Southern Ocean.
Pottsiscalisetosus Pettibone, 1969	numerous	2,4,5,7, alternate segments to 23,26,29,32, 33,35, continuing on alternate segments to end of body (may be some irregularity after segment 39).	thinner than neurosetae, tapered to blunt tips, very finely serrated	slightly to distinctly hooked, finely serrated, with semilunar pockets.	elytra large? has platelets commensal with asteroids Japan, Indian Ocean.
Uncopolynoe Hartmann-Schroder, 1960	unknown	unknown	absent	first 3 neuropodia have strongly curved hooks; other with uni or bidentate setae with serrated subdistal areas.	elytra large, associated with alcyonarians Red Sea.
Heteropolynoe Bidenkap, 1907	unknown	unknown	absent	unidentate, marginally serrated, slender in superior and coarse in inferior positions.	North Atlantic

have the lateral antennae attached directly to anterior extensions of the prostomium so the new species and *L. accolus* cannot be referred to *Lepidasthenia.*

On every specimen of *Disconatis* examined, the ceratophores of the lateral antennae are inserted termino-ventrally on the prostomium (Fig. 1E, F). This manner of insertion is typical of some genera which have previously been referred to the subfamily Harmothoinae. The subfamily status of some harmothoid genera is currently under review (Pettibone, pers. comm.) as, like *Disconatis,* they lack cephalic peaks and have certain parapodial features which distinguish them from the majority of harmothoid genera. Therefore we have avoided a subfamily determination for *Disconatis* here.

Some of the existing harmothoid genera show some similarities with *Disconatis* and could be confused with it. Within the Harmothoinae there are six genera which have elongate bodies and numerous pairs of elytra; comparison of the features of these genera with the new genus *Disconatis* is presented in Table 1. All six genera differ from *Disconatis* in two significant ways; they all have notosetae and the arrangement of elytra along the body is also different. *Disconatis* is unusual in that after segment 7, the elytra alternate with dorsal cirri to the end of the body. This arrangement distinguishes *Disconatis* from all six genera listed in Table 1. In the Polynoidae the most common arrangement, irrespective of body length or numbers of pairs of elytra, is to have the 12th to 15th pairs attached to segments 23, 26, 29 and 32. One other genus in Table 1 also differs from this common elytron attachment pattern; *Hololepidella* Pettibone, 1969 has the 12th-15th pairs attached on segments 23, 26, 29 and 31 but its elytron pattern is not the same as that seen in *Disconatis*. We have included in Table 1 two genera which bear some resemblance to *Disconatis,* although the numbers of pairs of elytra and their pattern of attachment are not known. *Uncopolynoe* Hartmann-Schroder, 1960 and *Heteropolynoe* Bidenkap, 1907 both lack notosetae, however neither has the unusual rows of serrations seen on the convex outer edge of the neurosetae tips in *Disconatis.* In addition, *Uncopolynoe* has strongly curved neurosetae in the first three setigers and the elytra are large.

All six specimens of the two *Disconatis* species were associated with tube-dwelling polychaete hosts, suggesting members of this new genus are obligatory commensals. Morphologically, specimens of *Disconatis* exhibit a diminution of the elytra and notopodia, a characteristic of several genera of commensal polynoid scaleworms. The reduction of the size, thickness and ornamentation of elytra, the loss of notosetae and the reduced notopodia are apparently the result of sharing a tube with a host. Perhaps, the protection afforded by the tube, and the clean water circulated through the tube by the host, diminish both the need for elytra to form a defensive covering and the requirement for large elytra and the presence of notosetae as aids in keeping the dorsal respiratory surface of the body clean. In specimens of *Disconatis,* the first pair of elytra are much larger than the subsequent pairs and may afford some protection to the head, particularly if the scaleworm's habits include sticking the anterior end out of the host's tube. A similar set of characteristics is known for some species of the genus *Perolepis* (Ehlers, 1908) in which all but the first pair of elytra are vestigial, the notopodia are small and notosetae are absent. *Perolepis* is a genus which is placed in the subfamily Lepidonotinae, and the presence of similar reductions of structures in genera from different subfamilies of the Polynoidae indicates a convergence due to parallel evolutionary trends.

Disconatis accolus (Estcourt) comb. nov.

(Figs 1E, 1F, 5)

Lepidasthenia accolus Estcourt, 1967: 68-69, Figs 1-4.

Type material. HOLOTYPE — NZOI SIR G31, Heatheote Estuary, Christchurch 43° 33′S 172° 44′E New Zealand, 29.v. 1961, coll. I.N. Estcourt.

Description. *Holotype:* Body flattened, elongate, tapering slightly anteriorly and more so posteriorly. Parapodia near posterior end projecting anteriorly. Length 56.5mm, width including parapodia 3.96mm. 152 segments 35 segments of which appear to be regenerating as they are much smaller. Mid-dorsum between parapodia darkly pigmented with flecks of dark pigment lightly scattered over prostomium, dorsum and elytra. Numerous, minute papillae on dorsal

surface (Fig. 5B). Elytra small, vestigial, first pair much larger than following pairs. Elytrophores small.

Prostomium bilobed, much wider than long, roughly hexagonal, posterior half wider than anterior half without cephalic peaks (Fig. 1E). Two pairs of eyes, anterior pair smaller, crescentic, lying dorso-laterally at greatest width of prostomium. Posterior pair of eyes larger, oval, dorsal, lying close behind anterior pair, closer to midline. Two palps, moderately long with gentle taper. Three antennae, all smooth. Median antenna ceratophore in anterior notch, deflected upwards, style long, evenly tapering to tip. Lateral antennae ceratophores well defined, attached termino-ventrally, visible on underside of prostomium, not merging midventrally (Fig. 1F), styles short, basally stout, evenly tapering to tips. Tentacular or first segment achaetous, not visible dorsally, tentaculophores lateral to prostomium, two pairs of tentacular cirri similar length as median antenna, dorsal pair slightly larger than ventral pair. Second or buccal segment with first pair of elytra, subbiramous parapodia, ventral, buccal cirri much longer than following ventral cirri.

Parapodia subbiramous (Fig. 5H, 5I). Anterior parapodia almost cylindrical in cross section, much thinner in dorso-ventral plane than subovate posterior parapodia. Notopodium small, reduced, with notoaciculum, without notosetae. Neuropodium elongate, presetal lobe slightly longer, evenly tapering to rounded tip with indentation adjacent to distal tip of neuroaciculum. Postsetal lobe slightly shorter, lanceolate. Dorsal cirrophores large, stout; styles long, cirriform, smooth, extending well past tips of neurosetae. Ventral cirri short, cirriform, much shorter than neuropodium. Nephridial papillae not discernable. Neurosetae long, thin with subdistal swelling and rows of serrations below unidentate tip. Convex outer edge of neurosetae with unusual serrations (Fig. 5E). Upper neurosetae longer, thinner and with more rows of serrations than middle neurosetae. Inferior neurosetae, shorter, stouter with fewer rows of serrations than middle neurosetae (Fig. 5D-F). Elytra numerous pairs (up to 76) attached on segments 2,4,5,7,9,11 continuing on alternate segments to end of body. Elytra with smooth margins, without papillae or tubercles on surface (Fig. 5G). Some elytra with pigment patches.

Pygidium well developed, flattened and circular with pair of anal cirri, missing from holotype but attachment scars clearly visible (Fig. 5A). Anus dorsal. Holotype with many eggs in body cavity.

Habitat. Commensal with the polychaete, *Abarenicola affinis* Wells, 1963 (Arenicolidae).

Distribution. Known only from the type locality. Heathcote Estuary, Christchurch, New Zealand.

Disconatis contubernalis sp. nov.

(Figs 2, 3, 4,)

Type material. HOLOTYPE — NTM W3957, Barrow Bay, Port Essington, Northern Territory 11° 21′S 132° 13′E, from tube of maldanid polychaete, mudflat in front of mangroves, 18.ix. 1985 coll. R. Hanley, C. Watson Russell, M. Burke. PARATYPES — NORTHERN TERRITORY: NTM W3959, Barrow Bay, Port Essington, 11°21′S 132° 13′E, from tube of maldanid polychaete, mudflat in front of mangroves, 18.ix. 1985, coll. R. Hanley, C. Watson Russell, M. Burke; NTM W3963, Creek "H" East Arm, Darwin Harbour, 12° 32.6′S 132° 56.6′E, from tube of maldanid polychaete, mudflat, 28.xi. 1985, coll. R. Hanley; NTM W3961, East Arm Boat Ramp, Darwin Harbour, 12° 29.5′S 130° 54′E from tube of maldanid polychaete, 31.i. 1984, coll. R. Hanley; NTM W4841 Ludmilla Creek, Darwin, 12° 24.4′S 130° 50.6′E, from tube of maldanid, mudflat, 1983. coll. R. Hanley.

Description. *Holotype:* Body, elongate, almost quadrate, rapidly tapering at anterior and posterior ends. Parapodia, particularly those near posterior end, projecting anteriorly. Length 23mm, width including parapodia 2.30mm. 68 segments. Dorsal surface of body between parapodia darkly pigmented. Elytra small, vestigial, first pair much larger than subsequent pairs. Elytrophores small.

Prostomium bilobed, wider than long, hexagonal, anterior half wider than posterior half, without cephalic peaks (Figs 2A, 3A, B). Two pairs of circular eyes, anterior pair larger, lying dorso-laterally at greatest width of prostomium; posterior pair lying close

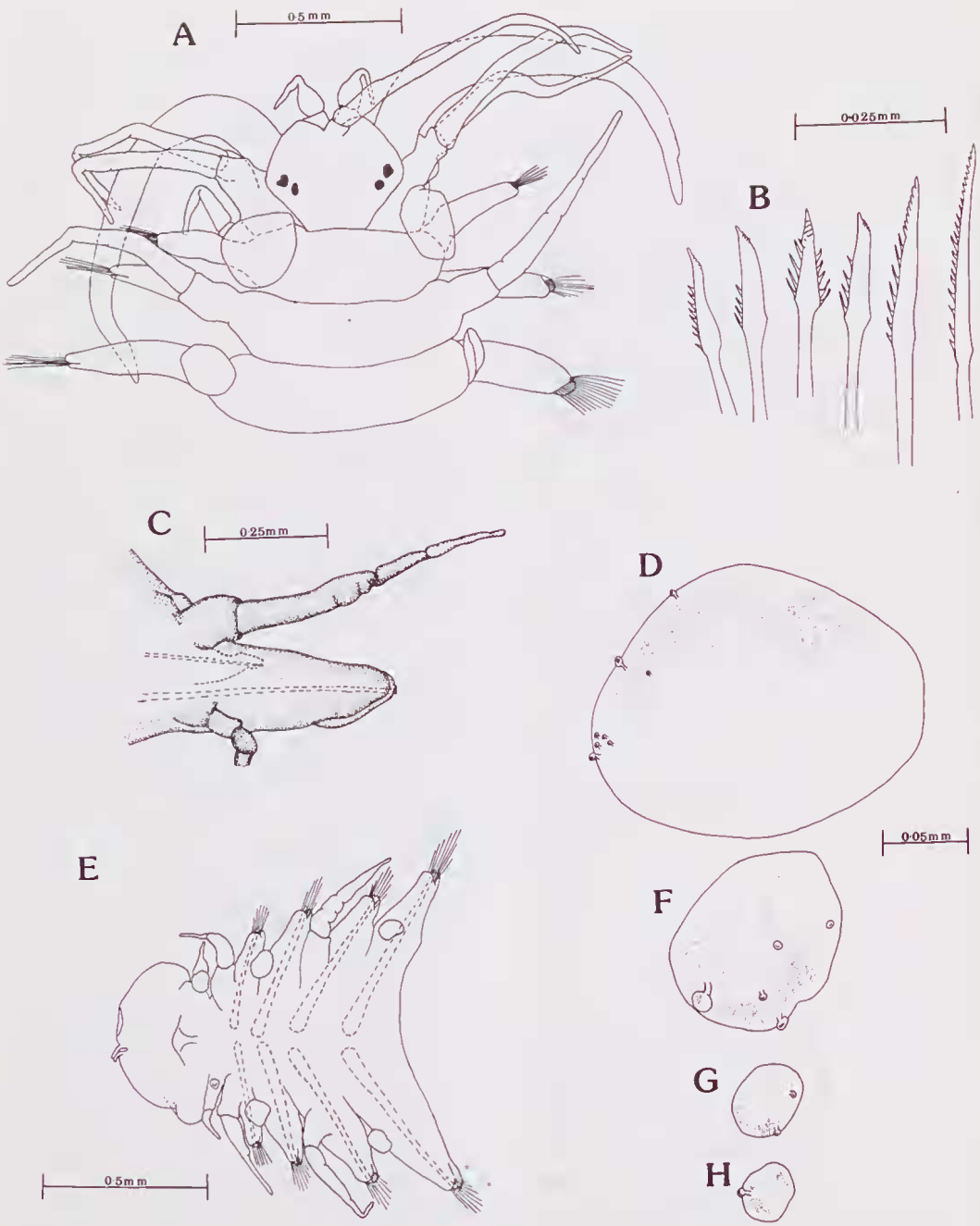

Fig. 2. *Disconatis contubernalis* holotype: **A,** anterior end; **B,** neurosetae from anterior segment; **C,** cirrigerous parapodium from anterior segment; **D,** elytron from second segment; **E,** posterior end showing distinctive flattened pygidium and small pair of anal cirri; **F,** elytron from 14th segment; **G,** elytron from 24th segment; **H,** elytron from 55th segment. D-H to same scale.

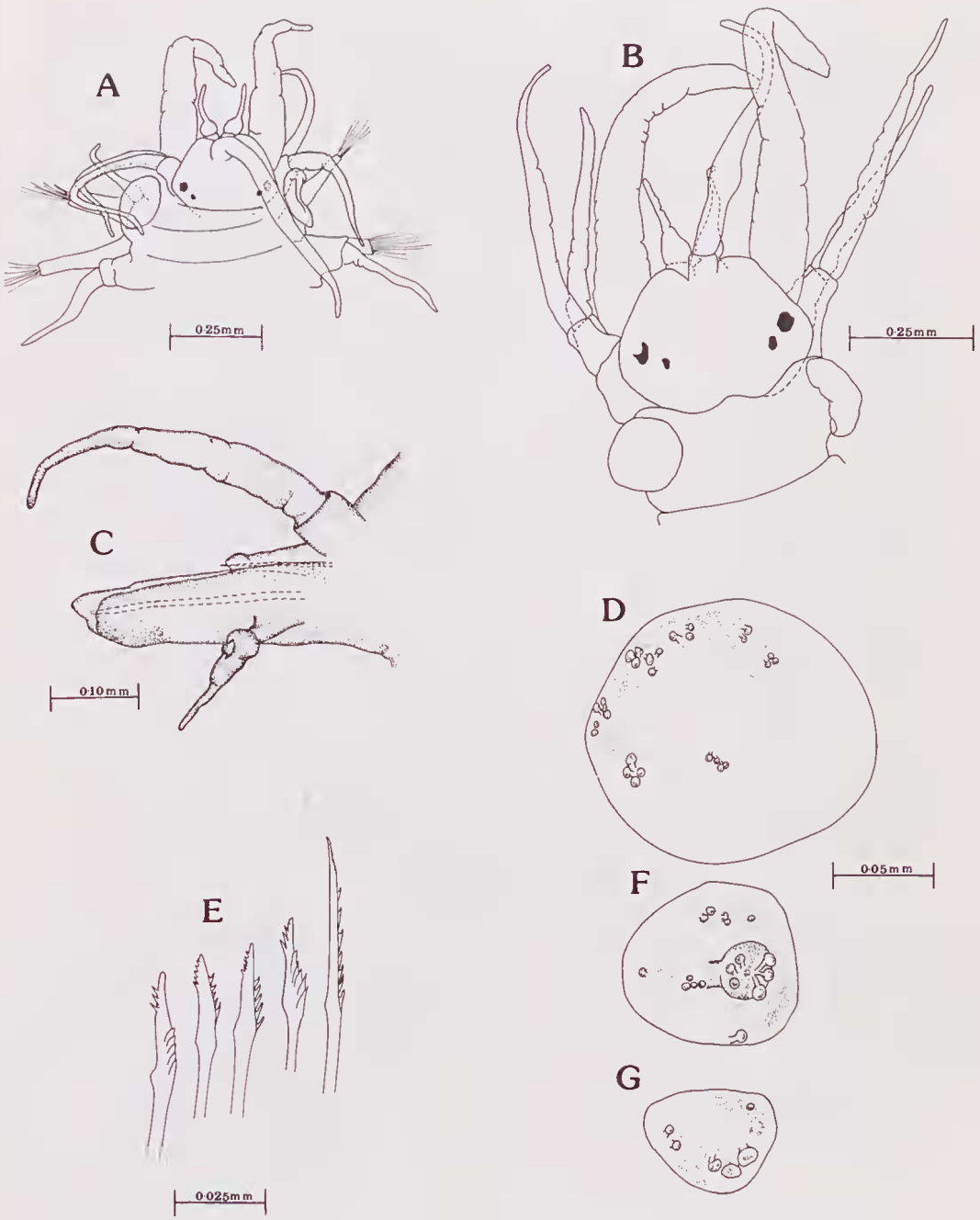

Fig. 3. *Disconatis contubernalis* paratypes: **A,** anterior end, NTM W3961; **B,** anterior end of NTM W3963, parapodia not figured; **C,** cirrigerous parapodium from anterior end of NTM W3963; **D,** elytron from second segment of NTM W3963; **E,** neurosetae from anterior segment of NTM W3963; **F,** elytron from 9th segment of NTM W3963; **G,** elytron from 35th segment of NTM W 3963. D-G to same scale.

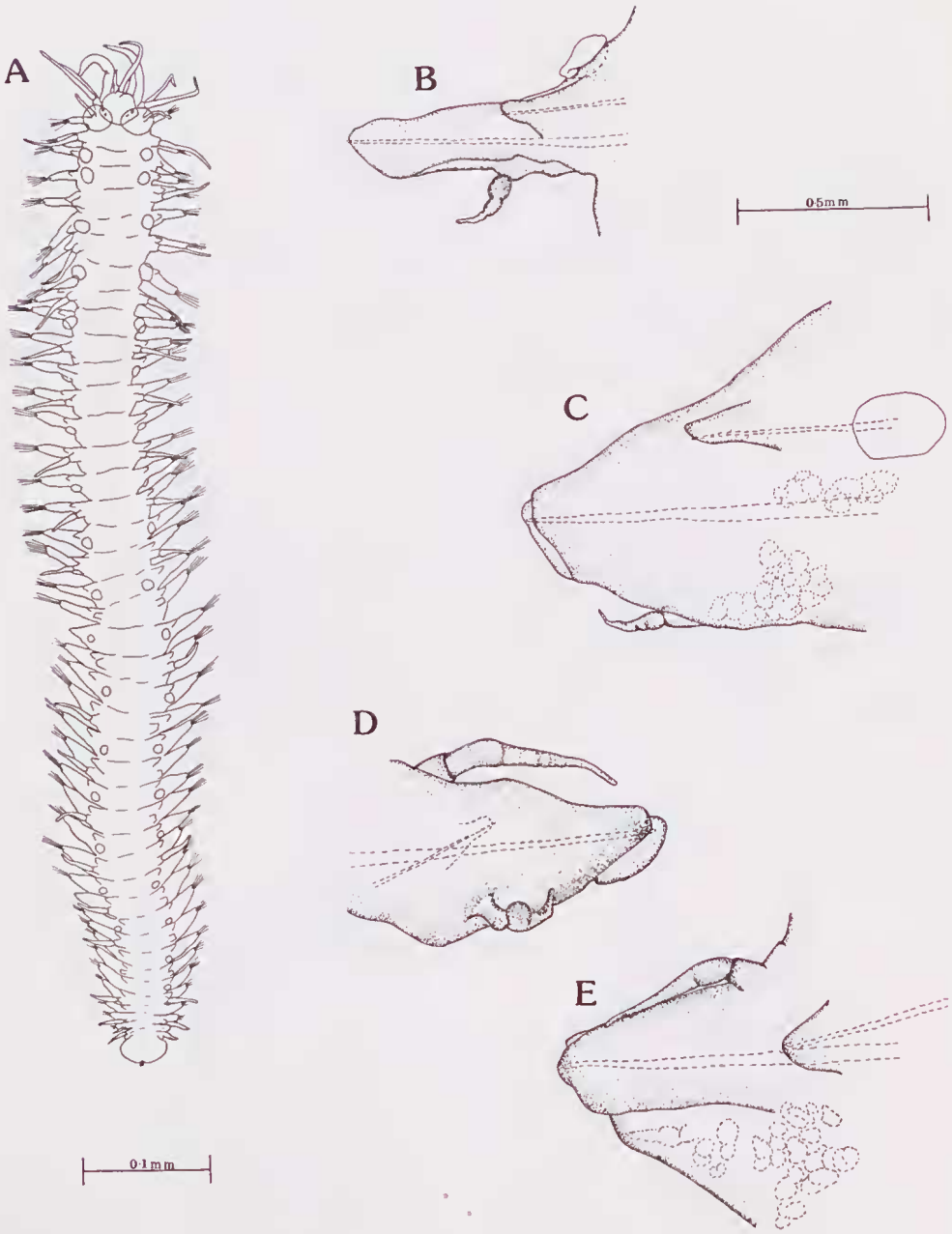

Fig. 4. *Disconatis contubernalis* paratypes: **A**, dorsal view of NTM W 4841; **B-E** NTM W3959 — , **B**, elytragerous parapodium from anterior segment; **C**, elytragerous parapodium from posterior segment; **D**, cirrigerous parapodium from anterior end of body; **E**, cirrigerous parapodium from posterior end of body. B-E to same scale.

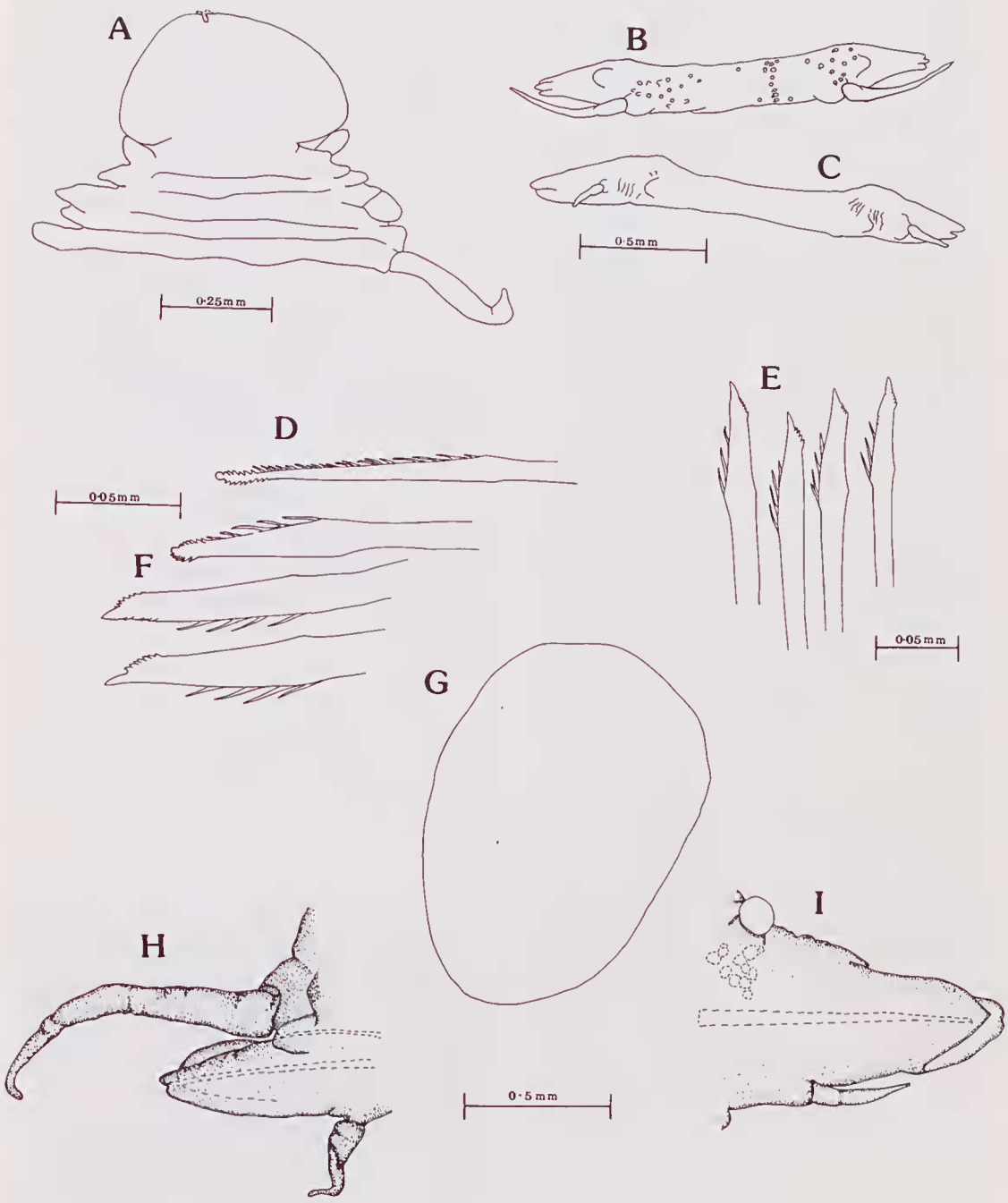

Fig. 5. *Disconatis accolus* holotype: **A,** posterior segments and distinctive, flattened pygidium; **B,** dorsal surface of anterior segment showing distribution of papillae; **C,** ventral view of anterior segment; **D,** superior neuroseta from anterior segment; **E, F,** middle and lower neurosetae showing unusual spinous ridges on convex edge near tip; **G,** elytron from second segment; **H,** cirrigerous parapodium from anterior end; **I,** elytragerous parapodium from middle of body. B,C to same scale, D,F to same scale, G-I, to same scale.

behind anterior pair, closer to midline. Two palps, relatively long, gradually tapering. Three antennae, smooth. Median antenna ceratophore in anterior notch deflected upwards, style long, gently tapering to filiform tip. Lateral antennae ceratophores inserted termino-ventrally, visible on underside of prostomium, not merging in the midline, styles short, stout bases, filiform tips. Tentacular (first) segment achaetous; not visible dorsally, tentaculophores lateral to prostomium, two pairs of tentacular cirri about the same length as median antenna, dorsal pair longer than ventral pair. No facial tubercle. Segment 2 with first pair of elytra, subbiramous parapodia, ventral buccal cirri considerably longer than following ventral cirri.

Parapodia subbiramous (Fig. 2C). Anterior parapodia almost cylindrical in cross-section, considerably thinner in dorsoventral plane than sub-ovate posterior parapodia. Notopodium small, reduced, notoaciculum present. Neuropodium elongate, presetal lobe slightly longer, wider, evenly tapering rounded tip, postsetal lobe slightly shorter, with rounded tip; neuroaciculum present, tip protudes from neuropodium. Dorsal cirrophores cylindrical, styles long, cirriform, smooth, extending well beyond neurosetae. Ventral cirri much shorter than neuropodium, cirriform, smooth. Nephridial papillae not visible.

Notosetae absent. Neurosetae long, thin with subdistal swelling and rows of serrations below unidentate tip. Unusual rows of serrations on the outer convex edge of tips of neurosetae (Fig. 2B). Upper and lower neurosetae longer, thinner and with more rows of serrations than middle neurosetae (Fig. 2B). Thirty four pairs of very small elytra attached on segments 2, 4, 5, 7, 9, 11, continuing on alternate segments to the end of the body. First pair of elytra much larger than following pairs (Fig. 2D-H). All elytra with smooth margins and no pigment. Surface of elytra with a few large papillae (Fig. 2D, 2F, 2G, 2H).

Pygidium moderately large, flattened, circular with pair of very small, stout cirri on posterior edge (Fig. 2E). Anus dorsal. Specimen with eggs in body cavity.

Paratypes: The four smaller paratypes resemble the holotype in most respects. There is no variation in the pattern of elytron attachment upon the body. The posterior half of the prostomium is wider than the anterior half, suggesting that the opposite condition in the holotype is unusual. Some variability in length and width of body and numbers of pairs of elytra was observed among the paratypes and is listed in Table 2.

Several of the elytra from the paratypes were found to have more of the large papillae on their dorsal surfaces than those noted on the holotype. A few of these large papillae also had some smaller papillae attached to their distal surfaces (Fig. 3F).

The shape of the presetal and postsetal lobes is also variable. While the presetal lobe is always slightly longer than the postsetal lobe, some parapodia had tapered rounded tips on both lobes, and sometimes the supraacicular portion of the presetal lobe is a little longer than the subacicular portion (Fig. 3C).

Habitat. Commensal with maldanid polychaete worms, intertidal.

Distribution. Darwin Harbour and Port Essington, Northern Territory.

Etymology. The species name *contubernalis,* refers to the commensal lifestyle of this species.

Table 2. Variable features of paratypes of *Disconatis contubernalis*

Paratype	Length (mm)	Width (mm)	No. segments	Pairs of elytra
NTM W3963	9.8	1.1	61	31
NTM W3961	7.8	1.2	45	23
NTM W4841	7.8	1.3	44	22

Remarks. *D. accolus* and *D. contubernalis* can be distinguished from each other by the following major characteristics. The elytra of *D. accolus* are smooth, while those of *D. contubernalis* have a few large papillae scattered over the dorsal surface. The many minute papillae found on the dorsum of *D. accolus* are absent from specimens of *D. contubernalis.* The postsetal lobes of parapodia on *D. accolus* are lanceolate, but those on specimens of *D. contubernalis* are rounded and resemble the presetal lobes.

Although both species of *Disconatis* are commensal with tube-dwelling polychaete worms, they are associated with two different families Arenicolidae and Maldanidae. *D. accolus* is known only from New Zealand, and *D. contubernalis* only from the Northern

Territory. The polychaete faunas of the two places are distinctively different, that of the Northern Territory is similar to that of the Indo-Malay archipelago, with a strong element of pan tropical Indo-West Pacific species, while the New Zealand fauna is characteristic of the southwestern Pacific with similarities to the fauna of the Southern Ocean and Antarctica.

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